

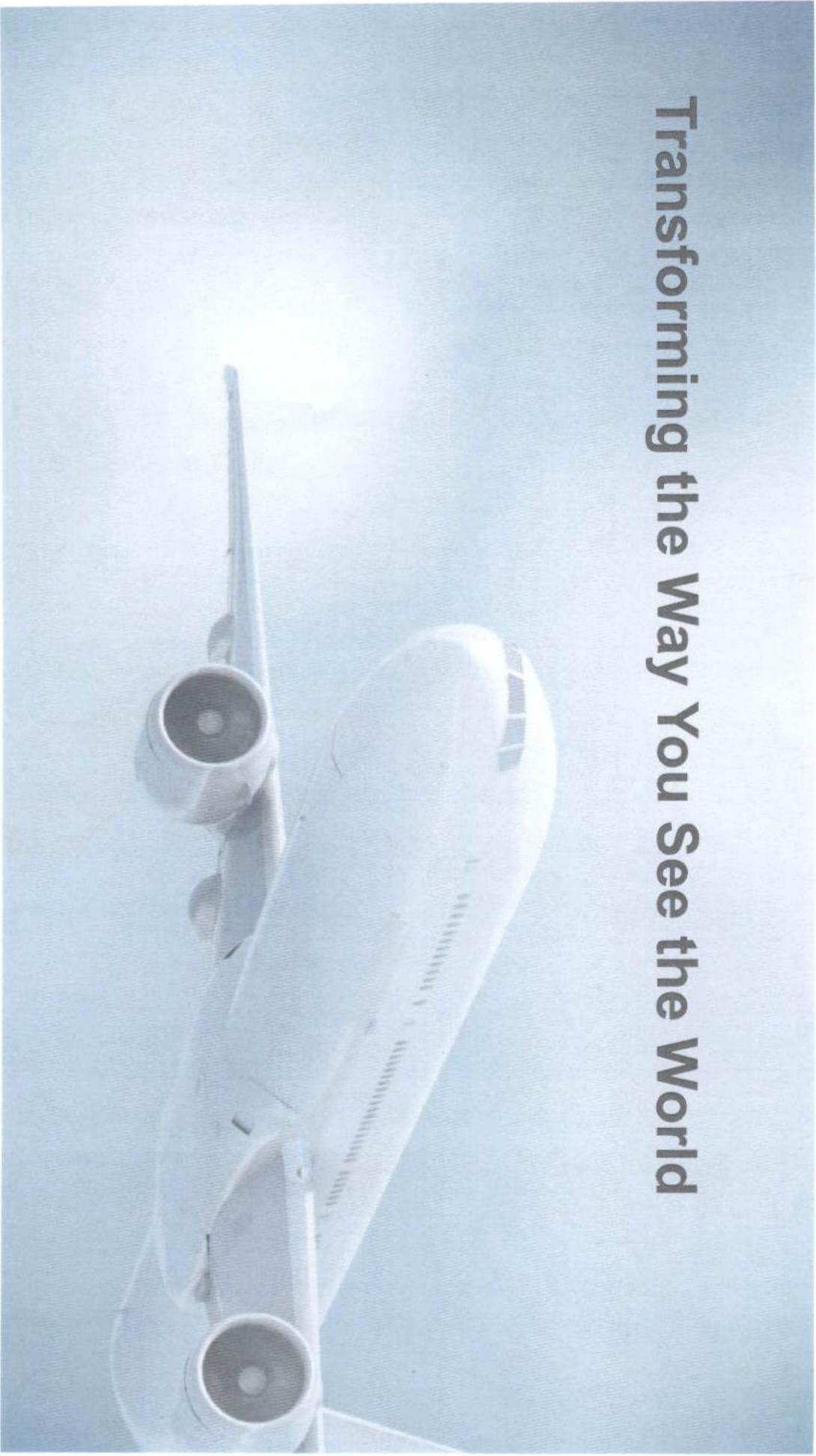


Space Based ADS-B Transforming Aircraft Surveillance

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Vice President, Sales & Marketing
July, 2014*



Transforming the Way You See the World



Automatic Dependent Surveillance – ADS-B (out)

- A proven surveillance concept through ground based stations
- Significant development in replacing or augmenting radar surveillance
- Upcoming transponder mandate for all aircraft in Europe and US
 - High current equipage rates
- Almost all new aircraft by default will have mode-s transponders

A quantum leap in aircraft surveillance — except...

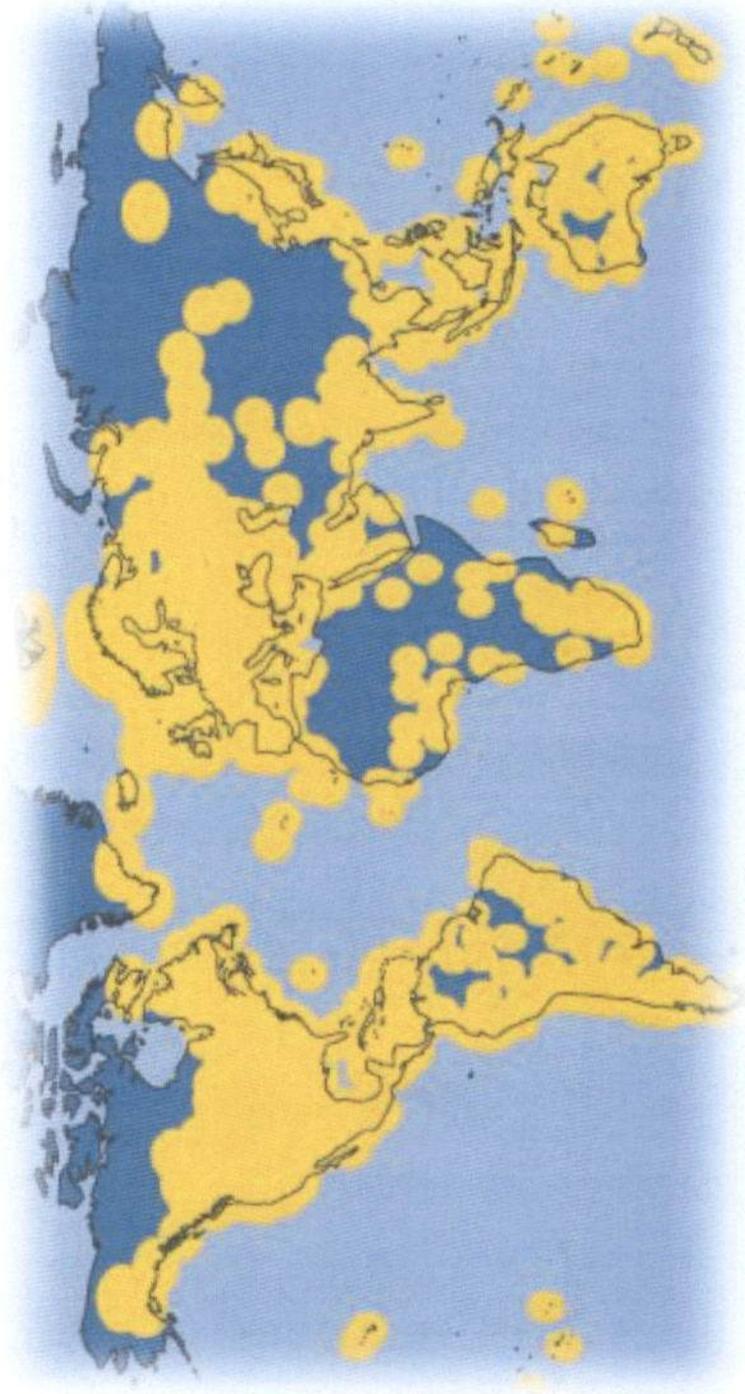
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Almost no oceanic and remote surveillance coverage



Why is surveillance coverage so limited?

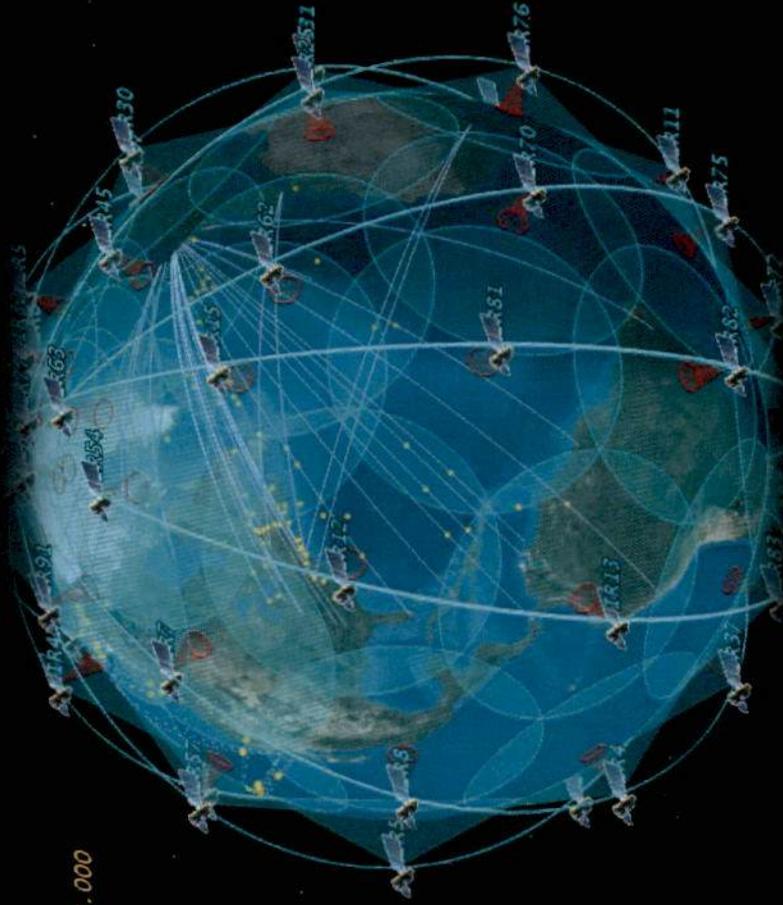
- Radars are expensive to purchase and have line of sight issues
- Ground stations can be challenging to install and maintain in remote areas
- No oceanic ground stations without landmass
- High upfront investment costs, barrier to entry
- Often limited low altitude coverage

Full coverage simply was not feasible... until



Global ADS-B coverage, no ground infrastructure

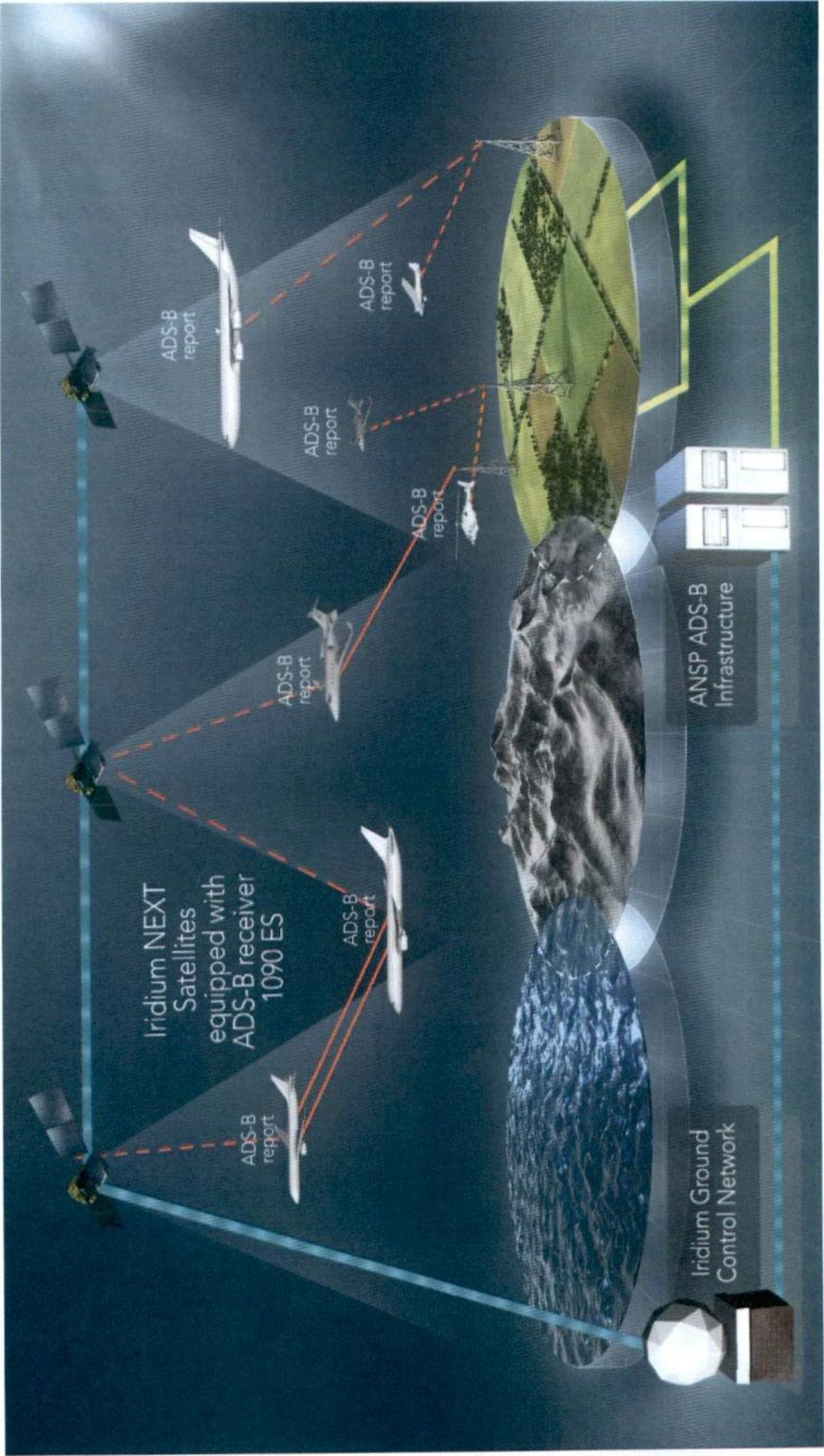
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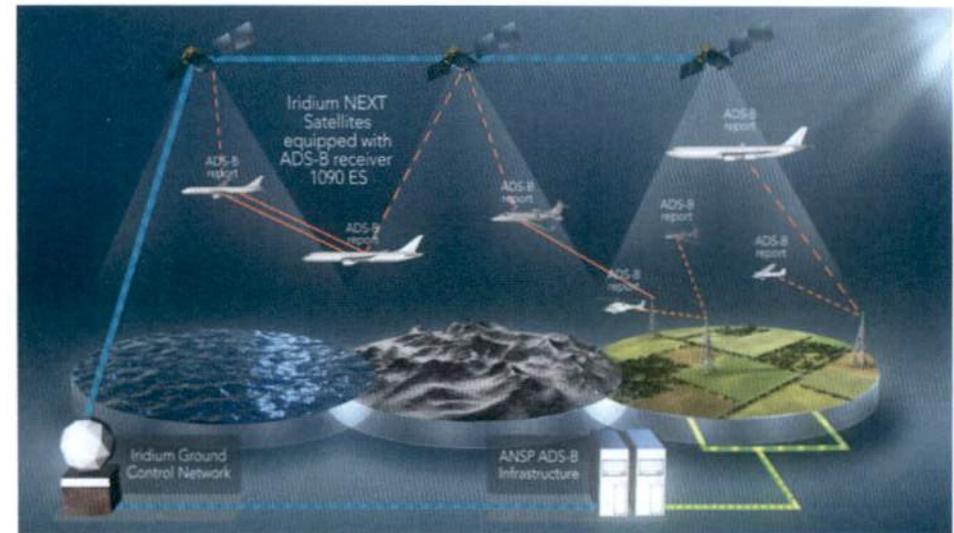


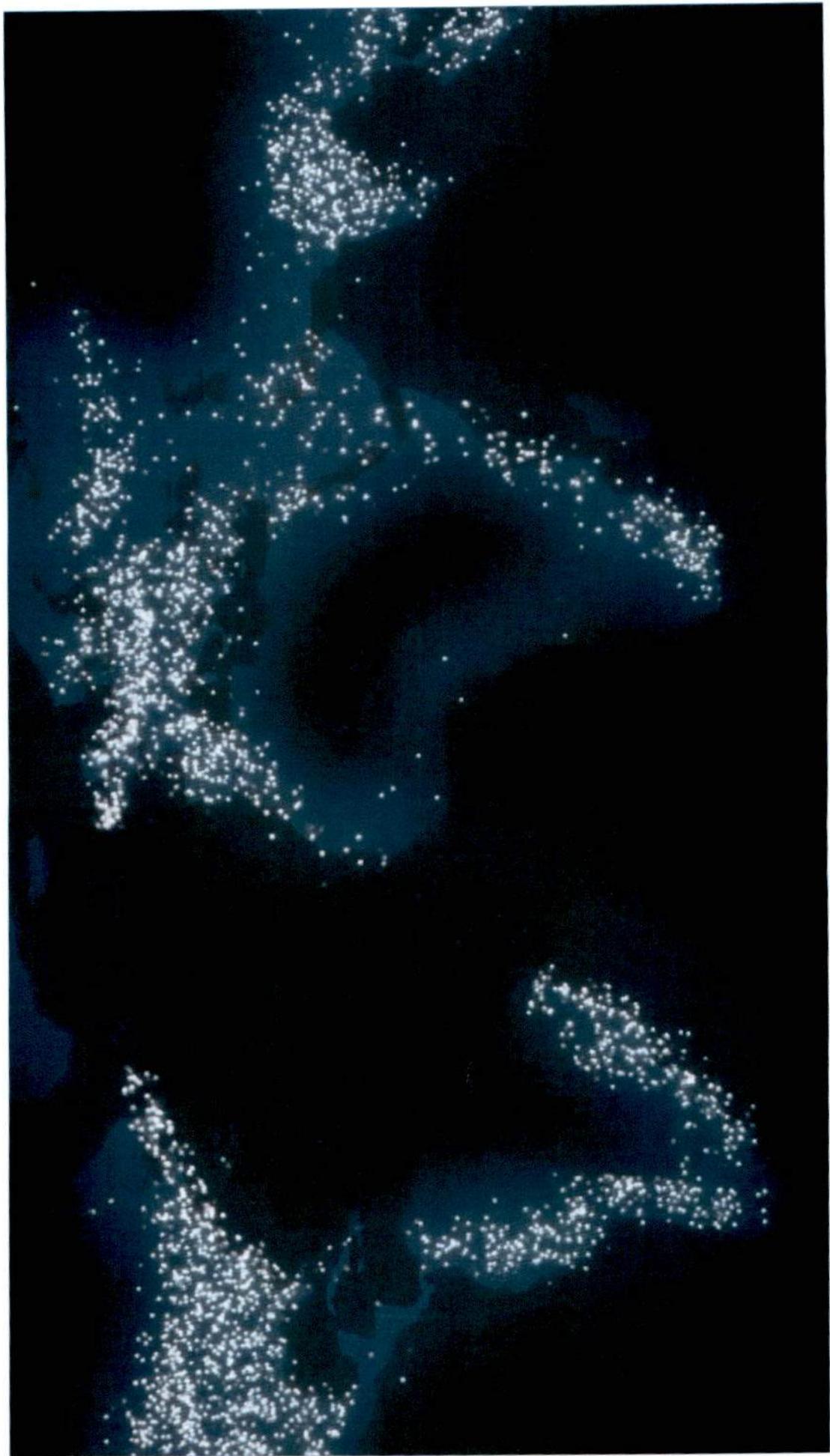


Transforming the Way You See the World

Performance is well within existing ADS-B standards.
Initial testing and certification shows promising performance for:

- Update rates
- Aircraft to controller latency
- Availability & reliability
- Global capacity

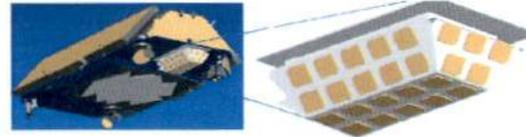






A reality close to implementation

- ADS-B receiver payload being developed by Harris Corporation
 - Harris selected to build 81 space-qualified ADS-B receivers in June 2012
 - 50+ years designing and manufacturing space hardware and major FAA contractor



- The ADS-B Hosted Payload Operations Center will be supported by Iridium
 - Developed by an Iridium/Boeing team in Virginia and Arizona



- Systems engineering and ground data processing system by Exelis
 - Exelis has significant expertise and existing ADS-B infrastructure
 - Service delivery on site or from VA location

Launch in 2015, Global Coverage in 2017





Developed, Owned and Supported by ANSP's

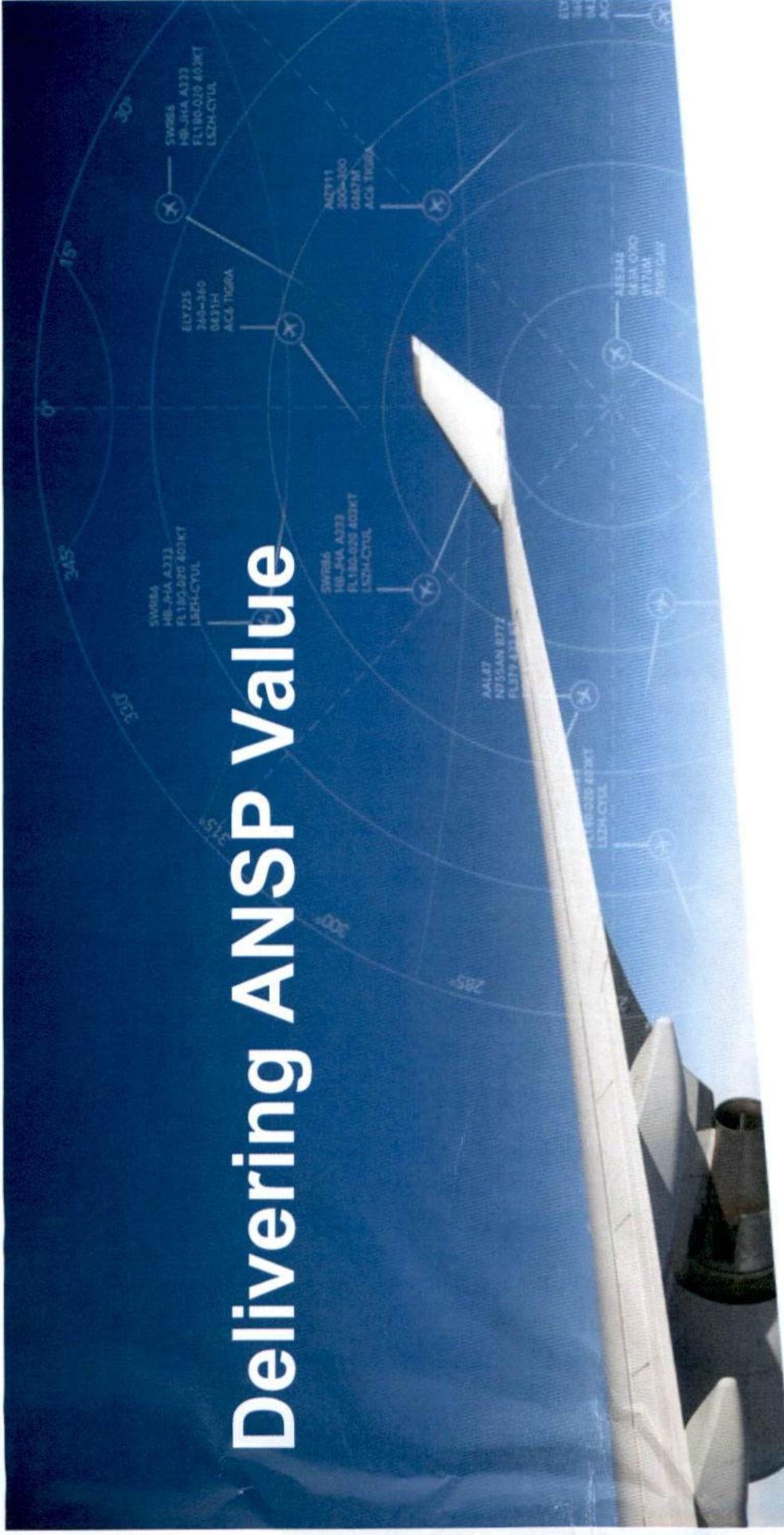




With advice and support of many stakeholders through the Space Based ADS-B Advisory Committee



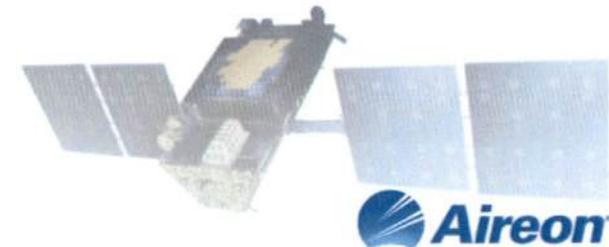
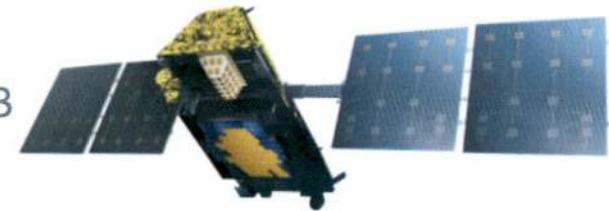
Delivering ANSP Value





Space Based ADS-B Potential is Evolving

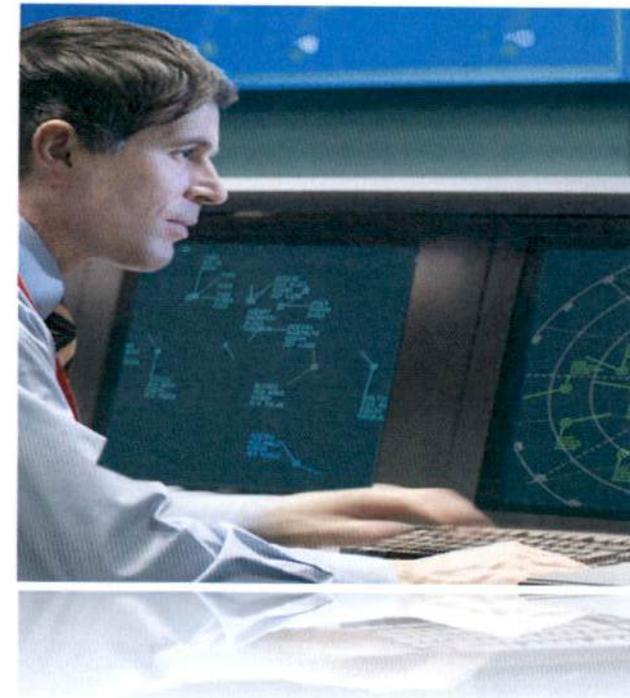
- Sole source of Surveillance
 - Near real time, radar like
- Complimentary Surveillance
 - Augment existing systems (fill coverage gaps)
- Contingency Surveillance
 - Possibility to replace radar with ground based ADS-B
- Tracking
 - Monitoring traffic in procedural environment without actual surveillance use
 - Emergency tracking, Search & Rescue
- Data provision
 - Traffic data for analysis or billing purposes



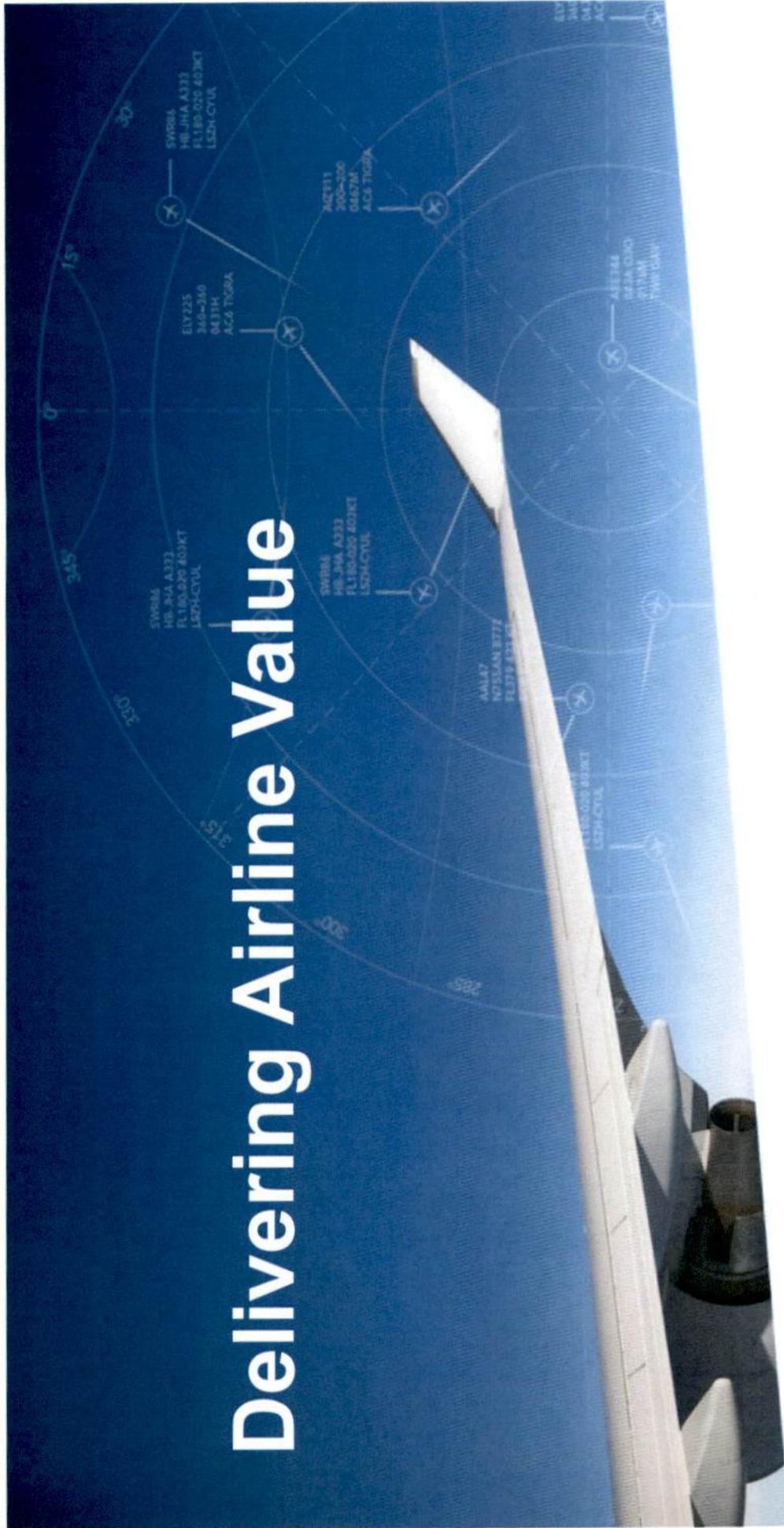


Value for ANSPs

- **Instant surveillance across your FIR**
Extend the benefits of terrestrial systems
- **Significant Infrastructure Savings**
No maintenance or replacement costs in remote regions. Almost no physical installation needed
- **Primary or Secondary Use**
Augment existing coverage, fuse with radar, ADS-B data or use as backup to existing systems
- **Route and Service Enhancements**
Flexible routing for airlines over ocean and remote regions, enable new route structures, better use of airspace. Attract more traffic
- **Safety Enhancements**
Real-time surveillance everywhere. Extend your early warning range across FIR boundaries.



Delivering Airline Value





Value for Airlines

- **Billions in Fuel Savings**
Use of more direct routes and optimal climbs
- **Return on ADS-B Investment**
No additional aircraft equipage required
- **Operational Efficiencies**
including optimized flight paths, altitudes, airspeeds and jet stream use
- **Reduced Emissions**
through fuel consumption optimization, a key benefit in cap and trade world
- **Enhanced Safety**
Eliminate surveillance gaps over regions with limited infrastructure or coverage

Global harmonization of surveillance, more seamless transitions, predictability.

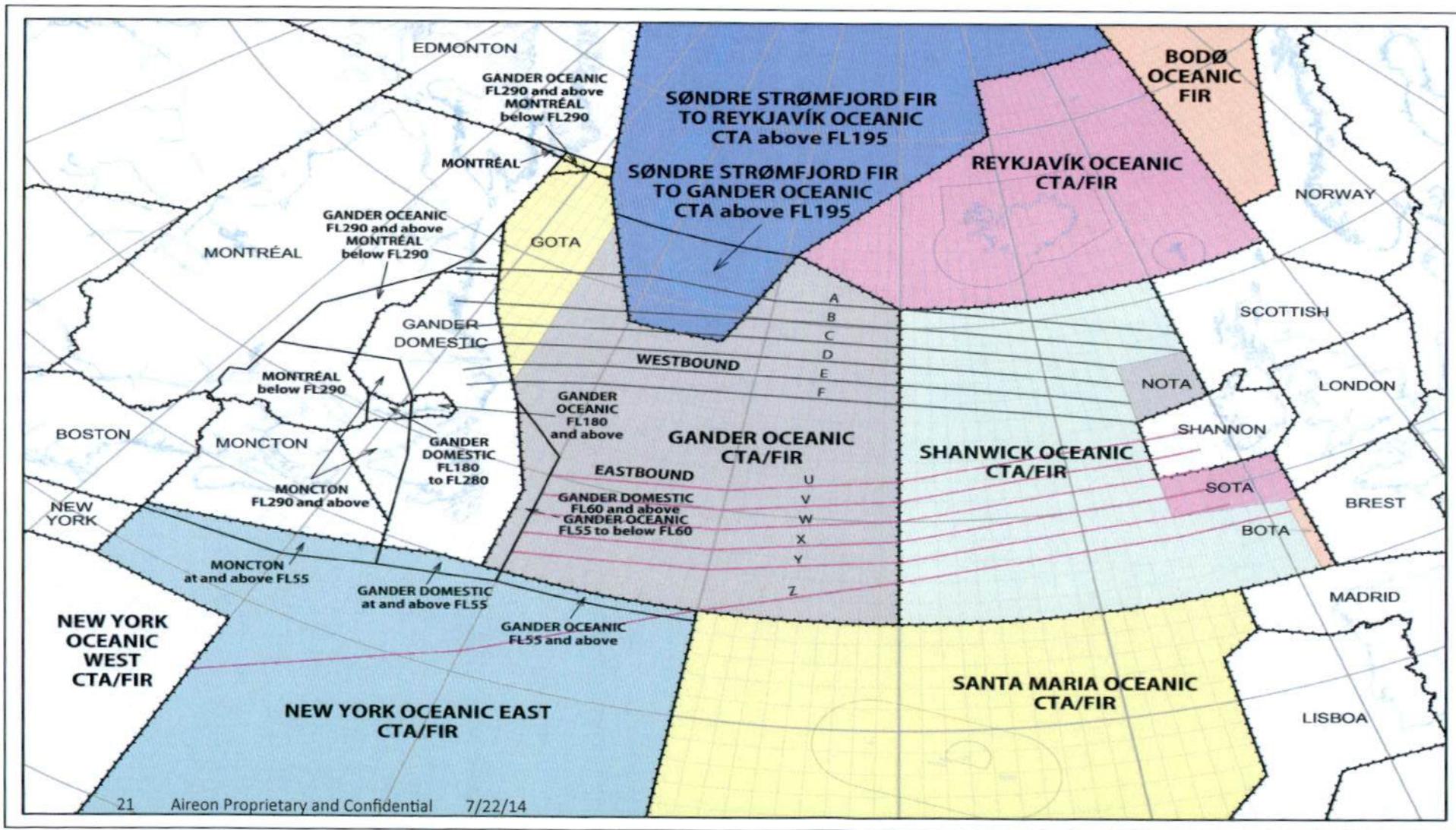




OCEANIC (North Atlantic)

Significant potential with oceanic and possible terrestrial use





ADS-C as a viable alternative?

- Extremely low update rate resulting in high separation standards
- ADS-C requires costly subscriptions for airlines and ANSP
- Each provider requires individualized equipage on aircraft
- Several commercial aircraft types can't be retrofitted for ADS-C
- Requires augmentation to achieve lower separation standards
- ADS-C has limited allowable receivers
- ADS-B is open

ADS-C has significant limitations

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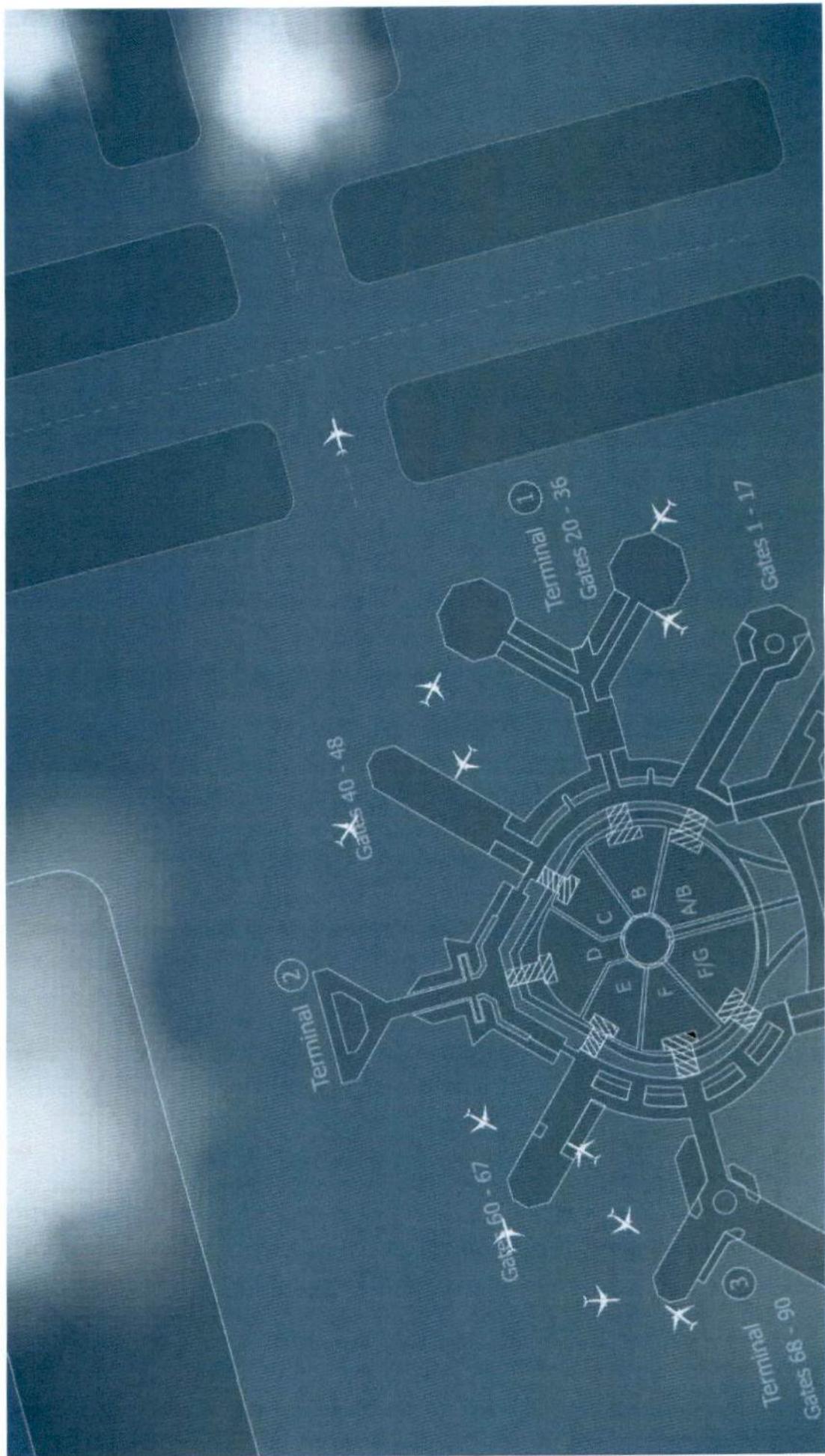


NAT Developments

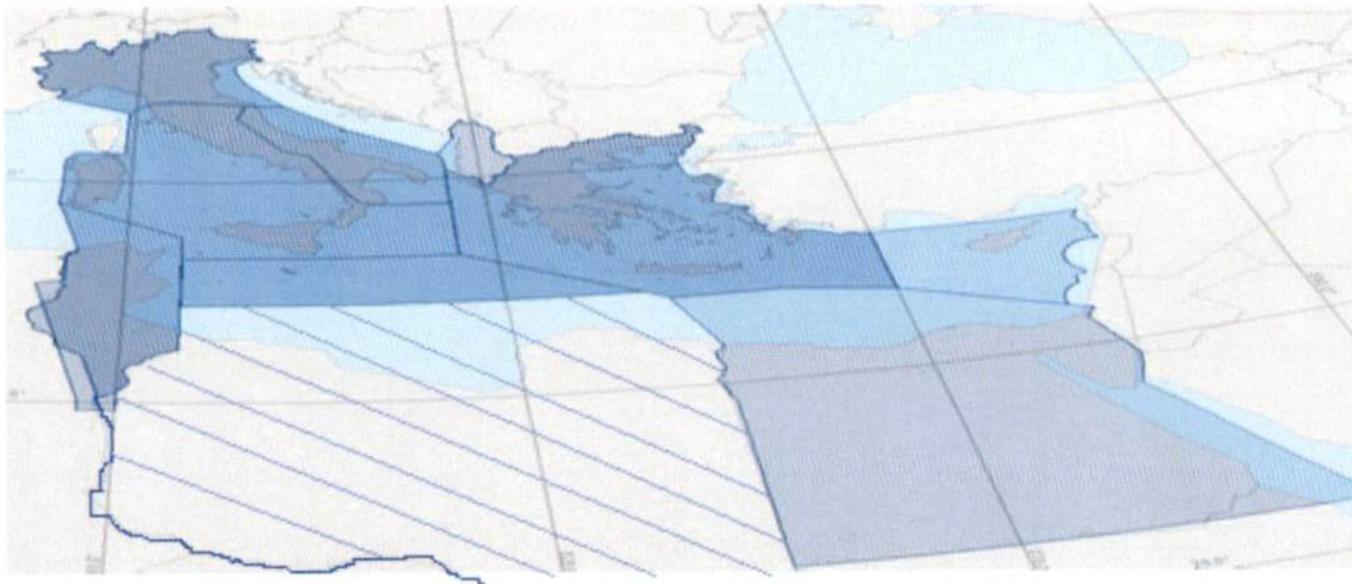
Initial Launch Customers: NAV CANADA, UK-NATS in close partnership with IAA and NAVIAIR.

ADS-B coverage over the North Atlantic

- 2016 Conformance Monitoring of space based ADS-B
 - Coordination between all involved ANSP's & regulators
- 2017 Initial Application of space based ADS-B in the NAT
 - 15NM / ½ degree separation, on tracks between surveillance identified a/c
 - Use of existing communications such as CPDLC, VHF & HF
- Early 2018: 15/15NM between all aircraft on the NAT
- Evolving thereafter...



Aireon on BlueMed Region



- Italy
- Greece
- Cyprus
- Malta
- Tunisia (associated partner)
- Albania (a.p.)
- Egypt (a.p.)
- Jordan (observer)
- Lebanon (observer)



Global developments

- Initial Launch Customers: NAV CANADA, ENAV, IAA, NAVIAIR
- UK-NATS signed 12 year data services agreement

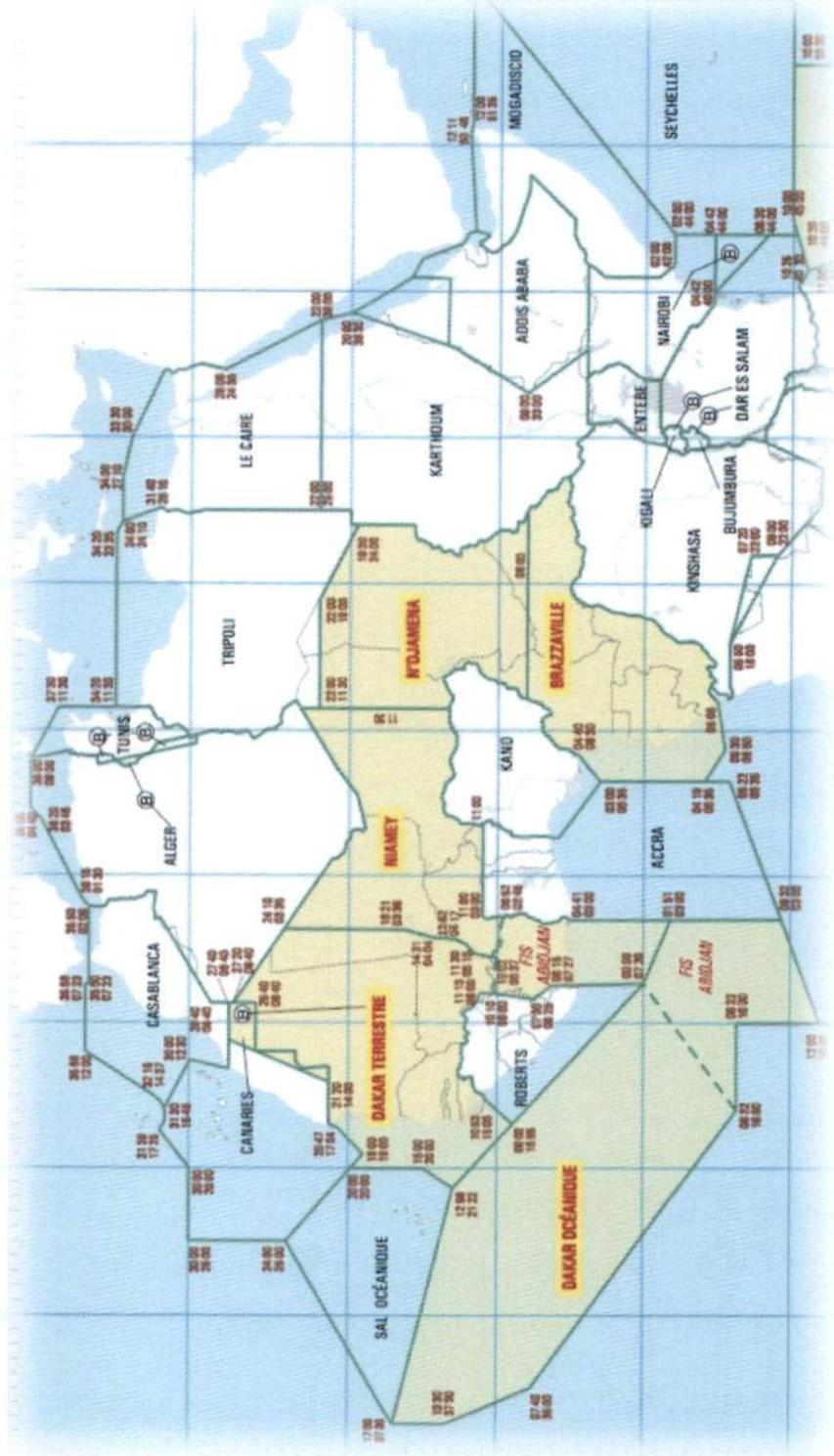
MOU is in place or being drafted for:

- United States (FAA)
- Portugal
- Singapore
- India (IAA)
- South Africa (ATNS)
- Significant interest at CANSO AGM from LATAM/CAR & ASPAC





Next: Explore Space Based Surveillance for ASECNA



7/22/14

Summary and closing slide

- The system is a near term reality, early ANSP involvement is critical
- ANSP's and regulators are working together to develop CONOPS
- Significant potential to expand surveillance and lower ATM costs
- No additional investment requirements for airlines

Aireon and our global partners are ready to work closely with ASECNA and other African ATM providers to make full surveillance coverage possible in the near future.

Your view on African skies will never be the same





- *Global Air Traffic Surveillance*
- *Transforming ATM*

